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# Atrial fibrillation patient with sleeve gastrectomy had pulmonary embolism even with the usage of apixaban

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## ABSTRACT

Our patient is a 48-year-old male known case of atrial fibrillation for 15 years, adherent to his medications, which are apixaban and beta-blocker. He has a history of sleeve gastrectomy two years ago and thereafter, developed a pulmonary embolism. There are studies that revealed that bariatric surgeries had an effect on some medications, especially in absorption. Most of the Direct oral anticoagulants (DOACs) are absorbed in the stomach and proximal intestines. This study demonstrates the possible relation between sleeve gastrectomy and reduced apixaban drug absorption, which can result in a risk of pulmonary embolism and *deep vein thrombosis* (DVT).

**Keywords:** Sleeve gastrectomy, atrial fibrillation, embolism, apixaban.

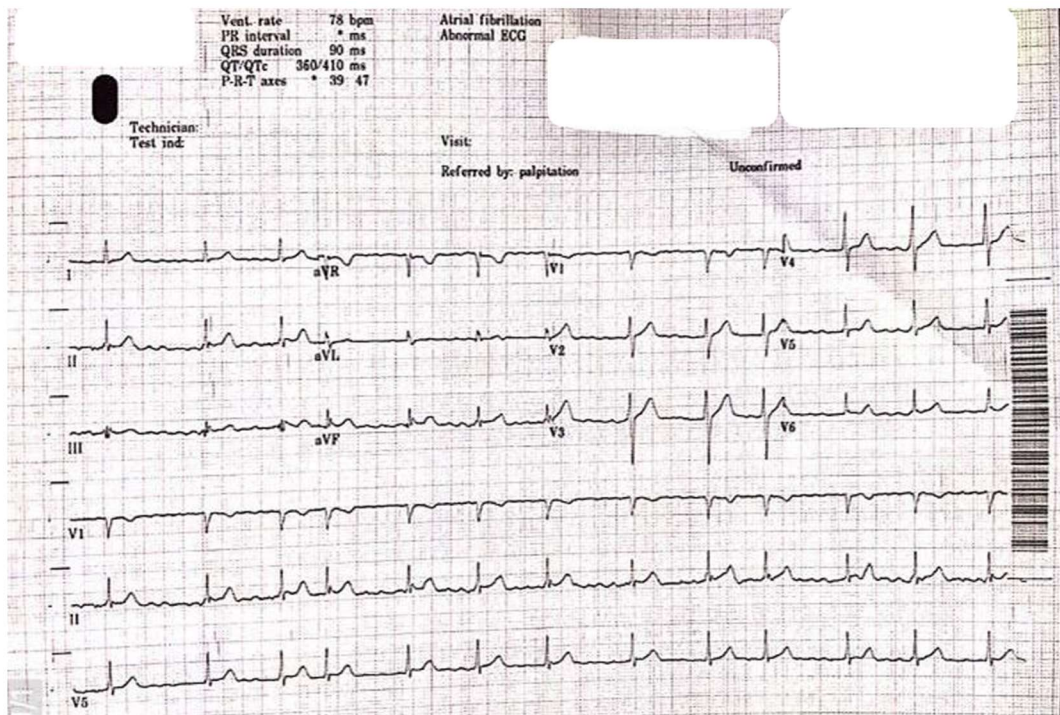
## 1. INTRODUCTION

Cardiac diseases represent one of the most important causes of mortality and morbidity in the world (Roth et al., 2015). The mortality and morbidity are due to either complications of the heart itself or other organ complications such as brain, kidney and liver illnesses (Correale et al., 2018; Finsterer & Stöllberger, 2016; Salleck & John, 2017). One of the major causes of stroke due to heart disease is atrial fibrillation (AF) (Hahne et al., 2016). However, in this case, we discovered something that rarely occurs with AF complications: An AF patient who has been adherent to his medications for 15 years developed pulmonary embolism 3 years after undergoing gastric sleeve surgery. We need to understand the connection between AF medications and their effect on bariatric surgery patients.

## 2. CASE PRESENTATION

A 48-year-old male patient non-smoker, known case of atrial fibrillation for 15 years presented to the Emergency department (ER) on October 27<sup>th</sup>, 2020, complaining of recurrent rapid and symptomatic palpitations associated with

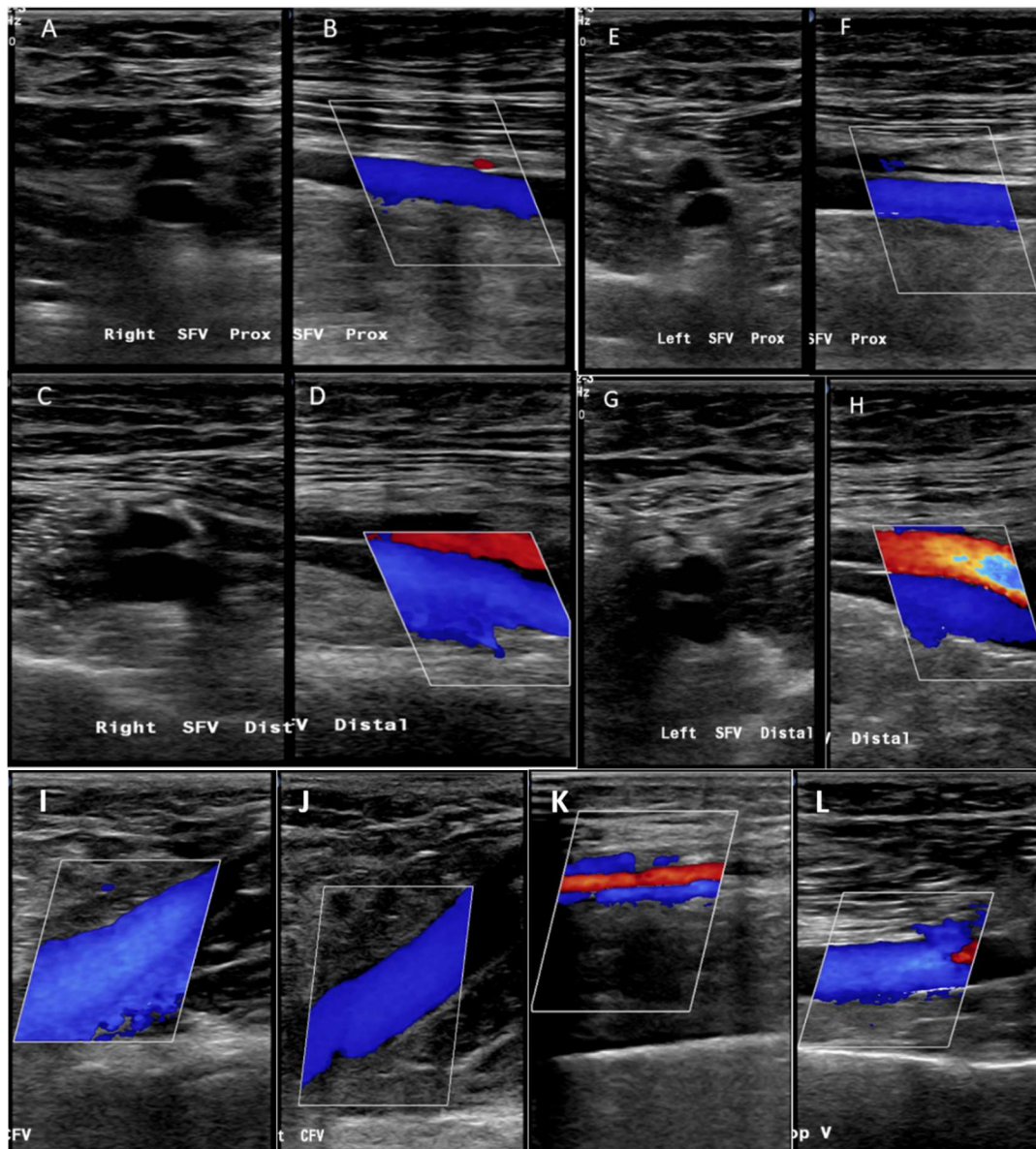
shortness of breath, dizziness and pre-syncope. He was adherent to his medications, which are apixaban 5 mg and amiodarone 200 mg once daily. He has no history of *deep vein thrombosis* (DVT). On physical examination: Vital signs were normal, with normal 1<sup>st</sup> and 2<sup>nd</sup> heart sounds with no added murmurs. On investigations: *Computerized tomography* (CT) angiography showed a filling defect in the sub-segmental branches to the right middle lobe consistent with a pulmonary embolism, with no other filling defects. Electrocardiogram (ECG) showed atrial fibrillation with palpitations and irregularly irregular rhythm, no ST elevation (Image 1). Cardiac enzymes: CK-MB:0.728, CK:66, Troponin T high sensitivity: 0.005. US-Bilateral Lower limb doppler was done (Image 2) and DVT was negative. *Echocardiogram* (Echo) (Image 3) and cardiac perfusion scans were done (Image 4); both were normal with a clear LAA. Chest X-ray showed no significant changes (Image 5).



**Image 1** ECG showed: An irregularly irregular rhythm, with no STEMI.

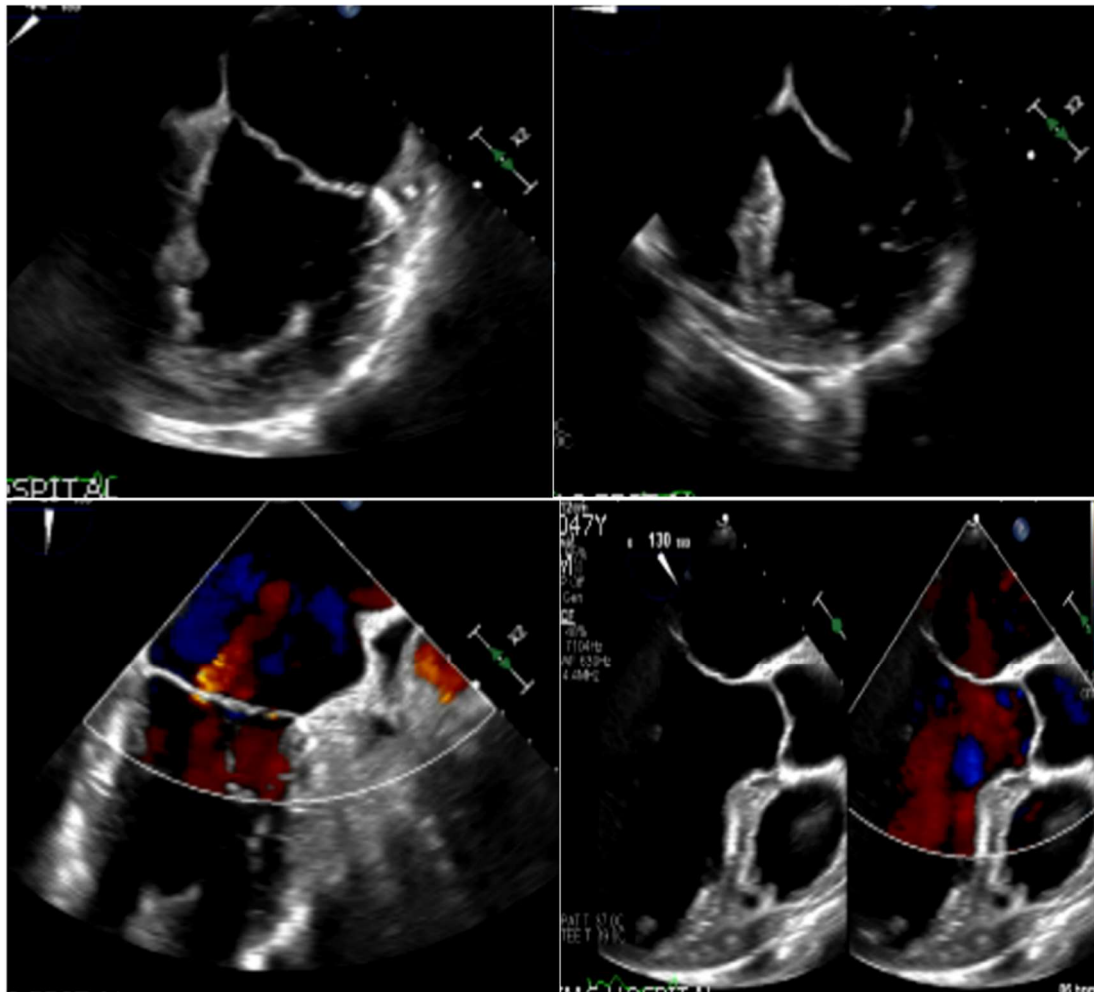
Protein C activity, Protein S activity and Factor V Leiden (G1691A) mutations were negative. Anti phosphatidylserine IgG, Antiphospholipid antibody complete profile and Lupus Anticoagulant: DRVVT (LA1) were normal. Anti Thrombin III: 70.1 Methylene tetrahydrofolate Reductase MTHFR (677C > T) was normal. The patient was started on warfarin 5 mg orally for the management of pulmonary embolism.

On July 2017, the patient underwent a sleeve gastrectomy procedure to reduce his weight. His height is 173 cm, his weight is 131 kg, and his BMI is 44 kg/m<sup>2</sup>. With multiple comorbidities such as AF, Arthritis, dyspnea, obstructive sleep apnea, *Gastroesophageal reflux disease* (GERD), fatty liver, varicose veins and low Vitamin D. The operation went smoothly without complications. On October 2018, the patient came to the hospital and presented with right upper quadrant pain. Ultrasound was remarkable for gallstones, due to this, he had a laparoscopic cholecystectomy, which went on without complications. On January 2020, the patient presented to our clinic complaining of recurrent attacks of rapid and symptomatic palpitations associated with dizziness and presyncope. After we determined that there was no thrombus formation, we offered to do cardioversion for the patient. The patient was admitted to the cardiac care unit (CCU) to rule out left atrial appendage (LAA) thrombus in order to do cardioversion. Upon admission, the patient was stable. Lab investigations were ordered and were within normal parameters. The patient's echocardiography was reviewed and showed a 55% ejection fraction. No regional wall motion abnormality. Mild mitral regurgitation. Normal right ventricular structure. Normal pulmonary arterial pressure.

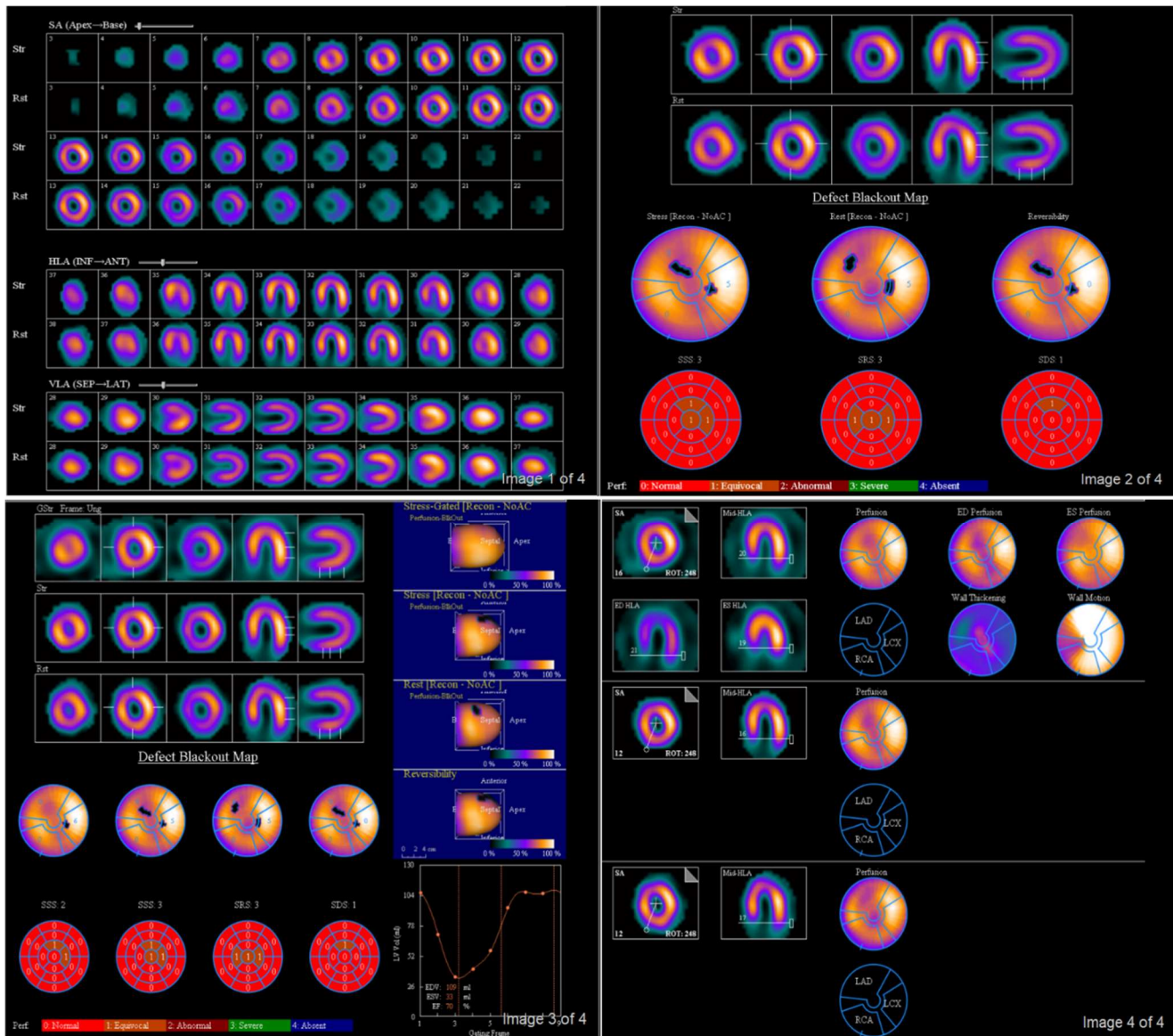


**Image 2** A&B: Right Superficial Femoral Vein Proximal. C&D: Right Superficial Femoral Vein Distal. E&F: Left Superficial Femoral Vein Proximal. G&H: Left Superficial Femoral Vein Distal, I: Left Common Femoral Vein. J: Right Common Femoral Vein. K: Posterior Tibial Vein. L: Right Popliteal Vein. Patent and compressible superficial and deep venous system with normal response to augmentation; no evidence of DVT.

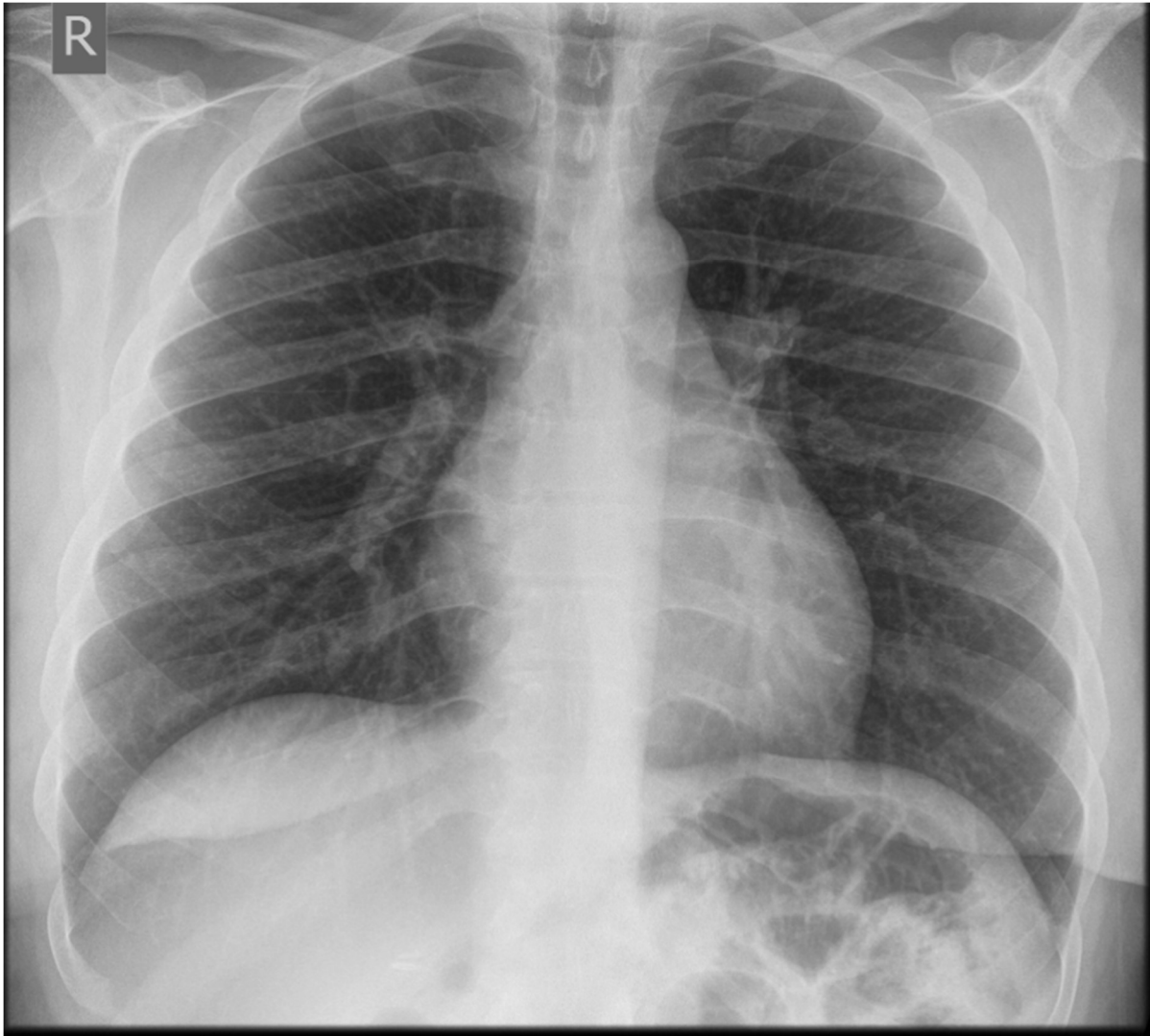
The patient received conscious sedation and had a transesophageal echo, which showed an ejection fraction of 55%, polylobate two lobes, LAA with no visible thrombus and mild mitral regurgitation. While he was sedated, he received a total of two DC shocks 100 Joules and 150 Joules and the patient was back to sinus rhythm on ECG. The patient's nebivolol was stopped and started on oral amiodarone. On October 2020, the patient came again to the clinic complaining of symptomatic palpitations associated with shortness of breath, dizziness and presyncope. He was adherent to the medications, which were Concor and amiodarone tabs, but still very symptomatic. On Jan 2020, the patient had electro cardioversion. 2 weeks earlier, he got a recurrence of persistent AF. The patient had an electrophysiological study and ablation in another hospital for persistent AF. On January 11<sup>th</sup>, 2021, the patient came in for a follow-up. About 3 weeks earlier, he went back into atrial fibrillation, which he felt palpitations. He had one episode of near-syncope while standing. He continued warfarin 6 mg daily and repeated coagulation profile every 4 weeks. On September 14<sup>th</sup>, 2021, the patient came back again with the same signs and symptoms of AF. He had an elective cardioversion after ruling out LAA thrombus. He continued his medications, which are warfarin 5 mg OD and flecainide 50 mg BID.



**Image 3** Normal Left ventricle size. Polylobate (two lobes) left atrial appendage. No left atrial appendage thrombus visible. Clean left atrial appendage with emptying velocity 20 cm/s. Mild mitral regurgitation.



**Image 4** Scan show homogeneous uptake at all segments of left ventricle with no evidence of stress induced ischemia or previous myocardial infarction. End diastolic is 109 ml, end systolic is 33ml. Calculated Ejection fraction is 70%.



**Image 5** Average cardio mediastinal silhouette, clear both lung zones with no active consolidation, clear costophrenic recesses, no evidence of pneumothorax.

### 3. DISCUSSION

Apixaban is a part of DOACs, which is a group of drugs that are used as an alternative to warfarin to prevent stroke and other vascular events in patients with non-valvular atrial fibrillation (AF). According to some studies, the absorption of the drug apixaban occurs in the proximal small intestines and stomach. Several studies revealed that various bariatric surgeries can affect apixaban absorption (Hakeam & Al-Sanea, 2017; Martin et al., 2017).

In our case, the patient had AF for a long time and was treated with apixaban. He was regular in his treatments. Later on, he underwent a sleeve gastrectomy operation, which required the removal of a part of his stomach. He continued on his medication (apixaban) to treat AF and then later on, he went back into AF and had one episode of syncope while standing, which made him come to the emergency department and he was prepared for cardiac ablation as a result. He had a CT angiography, which revealed that he had a pulmonary embolism despite taking his anticoagulation drugs and having no history of DVT. We believe this is because the absorption of his oral anticoagulation drugs was not optimal due to his previous sleeve gastrectomy. Another case report from Kuwait included a female patient who underwent a sleeve gastrectomy surgery and presented to the ER with DVT. She was treated with apixaban for 8 days before returning to the ER with a pulmonary embolism. She was subsequently put on heparin for 1 week before being switched to warfarin for 6 months with no adverse events (Bitar et al., 2022).

## 4. CONCLUSION

This report demonstrates a possible relation between sleeve gastrectomy and decreased apixaban absorption, which can result in a risk of pulmonary embolism and DVT, therefore we need to focus on patients with atrial fibrillation who had sleeve gastrectomy to use warfarin instead of apixaban to measure INR.

### Author contributions

Osama Abdulrahman and Fawaz Baalaraj were responsible for the abstract, background, design and literature review. Mohammed Alshinkity and Osama Abdulrahman were responsible for writing the case presentation. Raghad Hariri was responsible for the discussion. Abdulhalim S Serafi supervised the case overall and revised the paper.

### Informed consent

Oral informed consent was obtained from the patient.

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This study has not received any external funding.

### Conflict of interest

The authors declare that there is no conflict of interests.

### Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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